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Considers the following aspects of graduate research programs: Admission policies, relationship of scientific scholarship and teaching preparation, expansion of research and graduate training for doctorate, balanced development in support of research in different fields, review of research institutes, human resources, and the master's degree. Presents eight recommendations.

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The Research Function of the University
Proceedings of the University of Colorado
Sixth All-University Faculty Conference

1960

REPORT OF STUDY COMMITTEE NO. 4

Charles W. Jones, *Chairman;* Alan E. Flanigan, *Vice-Chairman;* Gustave O. Arlt, Edward W. Fager, Glenn H. Miller, Dean R. Parker, William O. Reinhardt, Paul K. Stumpf, Henry A. Turner

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RESEARCH IN THE GRADUATE PROGRAM

Several earlier conferences have discussed research in the graduate program, and the topic has been specifically treated in the *Proceedings* for 1947, 1951, and 1958. Therefore this report does not treat all aspects. On the one hand, graduate training has abundantly demonstrated its efficacy on broad lines. On the other, an All-University Conference is not the place to deal with specific methods, since graduate training is not a formula but only the sum of individual actions. This report is directed to a middle ground. There are problems of general concern that affect the graduate program at this time because of four changes:

1. The impact of "defense" on the public concept of scholarship and research, changing types of support and possibly introducing an imbalance.
2. The upsurge of population, possibly leading to quantitative and qualitative changes in scholarship.
3. Expansion of the number and kinds of graduate training centers in the University.
4. The Master Plan Survey.

I
Some Premises

The aim of university graduate training, whether academic, professional, or artistic, is production of scholars. Research, as defined for this Conference, is its essence. The means is apprenticeship. Training of scholars is disciplinary, but not curricular. The university community is an organism; students and faculty are but adapted cells, and the health of all depends on the vigor of each.

Although many agencies, both private and governmental, engage in fundamental and applied research and often make their resources available to university students and faculties, their aim, except in rare instances of quasi-universities, is not disciplinary; they are not equipped to produce the next generation of scholars.

A scholar advances learning by the twofold process of discovery, invention, or creation, and of dissemination. For this discussion, it seems pointless to discriminate between discovery, invention, and creation; suffice it that powers of curiosity, analysis, perseverance, and solution are fundamental requisites of all three. Power to disseminate is equally vital to scholarship. Learning that exists in a single mind is not learning at all. All dissemination may be called teaching. Teaching takes a variety of forms: instruction, publication, lecturing, demonstration, exhibition, and professional practice. Scholars must both create and disseminate, or learning dies. Being human, scholars may be more adept at one activity than at the other; but weakness in either is weakness in scholarship.

All graduate training revolves around research. In academic fields, in which the majority of students have decided upon careers as scholars, this principle is seldom questioned; but in professional fields the majority enter with the single aim of professional practice. From the viewpoint of society, a member of a "learned profession" needs to have scholarly methods and attitudes; he needs to be capable by ex-

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ample and by precept to lead others to responsible independent action at the earliest moment in time. Historically, the capacity for such leadership has distinguished the members of the learned professions. From the viewpoint of the university, it is primarily this aspect of graduate studies that justifies the inclusion of professional curricula in the graduate program. A practitioner can seldom interpret and apply scholarship with professional integrity unless he has been trained in the presence of research.

II
Admission

Research is problem-solving; it should be initiated by a student as soon as possible, but it must be preceded by mastery of a useful body of facts, laws, theories, and hypotheses, and by skill in employing them. Identifying and defining new problems is appropriate to a college education. If the ability and knowledge of the undergraduate allow, he should be encouraged to try a solution. The amount of encouragement to be given requires professional judgment: if genius is not encouraged, it becomes dull; if the less able are pushed, the product is pseudoscience. Admission to graduate training must not be limited to geniuses, to those who have solved problems—they will be a minority. But only those undergraduates should be admitted who have sharp tools, who habitually identify and define problems, and who want to learn to solve them. There are problems of theory and problems of practice, and an undergraduate will normally be more adept at one than at the other. The graduate school should eagerly welcome either kind and provide opportunity under counseling for each to move in the proper direction, provided he demonstrates that he wants to advance learning and not devote himself to technique—that is, sheer production.

III
Science and Teaching

Since advancement of learning is an indissoluble union of discovery and dissemination, every scholar is in prospect both a scientist and a teacher. Consequently, graduate training is training for both activities; specialization directed at one at the expense of the other is normally inefficient at the apprenticeship stage. With one goal, the individual has many functions, but differentiation is merely a matter of convenience. Increasing complexity requires increasing specialization, but the more specialized a scholar is, the more vulnerable he is without the support of scholars with other special qualities. Varieties of curricula, departments, and degrees should not obscure the fundamental dedication to scholarship. Different certificates, degrees, and titles may be useful, but only so long as names are not taken for facts. Attempted distinctions between academic and nonacademic graduate training have not been fruitful; the fundamental aim of each is the same.

Presumably all graduate training, except at the level of courses taken simply to acquire working knowledge, emphasizes, in one action, both discovery and dissemination. Seminars and dissertations, colloquia and publications, teaching and research assistantships, are arid if discovery and dissemination are not properly balanced. So, too, the individual relation of master and apprentice should be a two-way flow of both discovery and dissemination: the master is only a more experienced student, and the student is an embryonic master.

This Committee has studied the findings and suggestions (pp. 75–76) of the Liaison Committee, as published in *Faculty Demand and Supply in California Higher Education* (1958). It knows that the University will be derelict unless it does everything possible to increase the number of trained teachers. Following upon those findings, the Committee will discuss below the master's degree as a token of qualification for teaching. But at this point it emphasizes that the University must train teachers as it trains for all learned professions, by developing the power and desire to advance learning. If the University offered for training teachers a program in which research has no real part, it would

be entering an unknown field, with unfortunate consequences, while neglecting the very kind of training for which it is supported. If there are teaching posts that should and can be filled by those trained to disseminate an inherited, static, and formulated body of knowledge, then there are institutions better equipped to offer that kind of training. The University must hold to training scholars, capable of teaching how to live in a world where new problems and new combinations of old problems require new solutions. Consequently, every University-trained teacher must have had such contact with research as will ensure that he will habitally identify, formulate, and interpret new problems even while he is preserving and transmitting man's experience and the knowledge upon which the new solutions are based.

Some critics maintain that University-trained scholars, overspecialized by intensive training in research, find themselves teaching in high schools, junior, state, and independent liberal arts colleges, and are frustrated because they cannot continue to exercise their specialized training. For those and other graduates who find employment in nonresearch positions, the dissertation may be their final effort at scholarly research.[1] Insofar as this criticism is justified, it normally results from insufficient emphasis during training upon dissemination of learning as an integral part of scholarship. The committee believes that scholarship, far from inducing such frustration, creates enthusiasm for that kind of teaching to which the scholar's special talents and personal inclinations have led him. The need for impregnation of the whole educational system with true scholarship has never before been so pronounced.

An equal, though antithetical, frustration has been observed among scholars who take industrial, governmental, and other positions. In these instances, they lack, or seem to lack, a scholarly outlet for teaching. The Committee speaks below of the problem facing such men on our own staff. Not only is the University the trainer of scholars who find themselves at such extremes, both of which are necessary for the advancement of learning, but it must continue to act as a lively and sympathetic mediator with both, sharing its resources and keeping both from becoming isolated from the common stream of scholarship, for which the University must serve as center.

IV

Expansion

Graduate training for advancement of learning is a public responsibility of the University, and the University and the public have to work together for expansion, which must proceed at all levels of University activity, but with special emphasis on research and graduate training for the doctorate. ("The University shall have sole authority in public higher education to award the doctor's degree.... The University shall be the primary state-supported academic agency for research."[2]) Expansion of facilities for graduate training must proceed rapidly on the smaller campuses so that doctoral programs can be offered in the basic fields of learning. The most favorable research opportunities for staff members should be provided from the outset when new campuses are initiated. Graduate programs on the smaller and newer campuses must be expanded if the University is to attract and hold research scholars.[3]

Although the rate at which the University expands is dictated by many factors beyond the immediate control of the administration, available resources should not be spread too thin. Facilities on existing young campuses should first be expanded to the most efficient capacity for graduate training, with special emphasis on areas where now, or in the future, it will be deleterious not to expand. Because overcrowding on the large campuses will result in inefficiency, studies should now be

[1] *Proceedings of the Sixth All-University Faculty Conference,* 1951, pp. 9–16.

[2] "Master Plan Survey," *University Bulletin,* January 4, 1960, p. 100.

[3] *Proceedings of the Thirteenth All-University Faculty Conference,* 1958, p. 53.

conducted, field by field, with the object of anticipating dangerous overcrowding by attracting students to younger, less crowded campuses.

Full expansion of the existing facilities on the Davis, La Jolla, Riverside, San Francisco, and Santa Barbara campuses must proceed irrespective of the University's decision on the establishment of new campuses.[4] There is no place for a permanent "big-brother little-sister" arrangement in the University, but room only for a family that operates under one standard of excellence that attracts and provides equal opportunities for students and faculty of similar high quality, although not necessarily of like kind. The smaller campuses have been handicapped by lack of funds for research. Unless adequate support is forthcoming (including assistantships and fellowships in all areas), the quality of the programs on young campuses cannot be improved. Mere expansion of facilities and faculties in terms of FTE's will not suffice, for this kind of expansion only broadens present activities; it can contribute little to the kind of enrichment and development that the smaller campuses need for graduate work.[5]

All precautions should be taken to see that the expansion of graduate programs does not affect the quality of existing programs. Nevertheless, unless such expansion does occur concurrently and rapidly, in nearly all basic and some special fields on small campuses, where the Regents have committed the University to graduate training, it will be difficult for the University to justify the position of those campuses as units of the University in the Calfornia system of higher education.

The establishment of graduate training taxes the highest professional judgment and strains philosophical principles to the utmost; but it also offers inspiring opportunities. Graduate training is the indication that a campus has come of age and has self-determination in the University family. Thereafter it is judged by its advancement of learning. Among members of the University, family specialization is desirable, indeed necessary, but it has to be so judiciously determined as to assure full participation in the advancement of learning.

Campuses, like the scholars that compose them, have to capitalize on the attributes of their age—at one end, vigor; at the other, experience. Sheer youth runs wild, sheer age ossifies. Mixing the two where possible leads to advance. The tempory interchange of young assistant professors from the smaller campuses with experienced full professors from the larger campuses may be desirable for the initiation and guidance of new doctoral programs. Campuses should have more opportunity for drawing either experience or vigor from the others, but on their own initiative.

V

Balance

With increasing outside financial support of particular aspects of the physical and biological sciences and a relative scarcity of support in other fields, students are often faced with a conflict between a desire to do research in one of the latter and the necessity of obtaining sufficient income to live. The result is a real and dangerous tendency for students to be strongly influenced in the selection of a field by the money available in it. This may prevent, or at least delay, development of fields that are equally important but less well supported at present. It gives to external granting agencies an unwarranted, and probably unsought, power of decision in regard to the University's research program. The University could counter this by giving a larger part of its support to less popular fields and by applying overhead collected on federal or private projects to general University development. There are a number of examples of such procedure, e.g., the Alumni Research Foundation of the University of Wisconsin, which derives its funds from patents arising from biological research, gives financial support to research in the social sciences. There

[4] *Proceedings of the Fourteenth All-University Faculty Conference,* 1959, p. 38.

[5] *Ibid.,* 1959. p. 38.

would be greater assurance of balanced development if the University could somehow control all money supporting graduate students, awarding assistantships and fellowships solely on the basis of merit and without regard to the field of research. In the case of assistantships, complete balance is no doubt impossible because laboratory courses in the sciences require more assistantships than do, for example, courses in literature. An attempt should be made, however, to redress the balance.

VI

Institutes

Presumably all activities of the University are judged by their contribution to education. The impact of research institutes, bureaus, and centers on the graduate training program must be so judged by periodic review. Organized research units of the University are established, according to the interests of individual members of the faculty, to stimulate research in particular fields; but if they do not serve graduate training, they lack educational justification. Such periodic review should ask the following questions: Are all organized research units productive in terms of graduate training? How do they compare in general with departmental organization in training productivity? Do institutes unduly deprive the graduate student of inspirational instruction by taking the most able teachers away from students? Are some types of institutes more valuable than others in graduate training?

Review of existing institutes might provide information that would be of value in establishing institutes on smaller campuses.[6] The Committee is of the opinion that a limited number of appropriate research institutes would aid the development of graduate training on those campuses. They would attract outstanding graduate students and faculty members, and would facilitate the organization and conduct of certain types of interdisciplinary research. In addition, institutes would aid in training students in methodology, assist faculty in obtaining outside funds for projects, and provide research assistantships.

VII

Human Resources

Facilities for research are commonly thought of in terms of libraries, laboratories, and equipment; but of far greater importance are the men who make up the community. The essential requirements for research are a vigorous intellectual atmosphere and time for individuals to formulate questions and seek their answers. It is axiomatic that teaching duties must not be such as to prevent research. On the other hand, research centers may arise that may easily come to claim the entire attention of scholars, who thereby become professionally related to the product of their creativity, to the exclusion of other scholarly functions. Social support may lead to the proliferation of groups of scholars who are "loosely" attached to the University and yet who are not concerned with the total aim, which is educational. Can the University afford to invite scholars onto its staff and yet exclude them from its faculty? This Committee looks askance at any tendency to create "research professorships" which imply release, beyond the invaluable sabbatical and summer programs, from educational responsibilities. It believes that all effort should be made to bring into faculty responsibility those scholars now on appointment who are now excluded from teaching. Is not a revision of federal, state, and local financing in relation to the educational program here at issue? Does not the University defeat its prime purpose if it develops nonteaching organized research units with nonteaching professional personnel? Could it not better cooperate with and support extramural research centers?

With graduate students, time is a problem when they are faced with a conflict between the demands of course work and

[6] See also report of Study Committee No. 3, "Barriers to Research in the University," in particular "Released Time for Research" and "Departmental Responsibilities for Research Support."

assisting duties and a desire to spend all their time on research. Too often there is a real conflict between the needs of the University as a teaching establishment and as a center of research. If teaching assistants are not provided for the faculty on campuses with large undergraduate enrollments, the faculty is limited in research time. But are teaching assistantships which merely relieve professors proper training for students? Conversely, research assistantships may often train a student in a special technical proficiency without giving scholarly training. Faced with the demands of course work and of assistantship, a student too often lacks enough research time in his program.

When given opportunity, students choose fellowships over assistantships. Ideally, this is not necessarily a good choice, since an effective assistantship is a valuable component of training: teaching assistance should not only be practice in dissemination but should solidify comprehension of first principles; research assistance should indoctrinate with method and technique and at the same time arouse latent creative power. Both kinds of assistantships should provide a necessary part of training not available by other feasible methods. At their worst, assistantships are drudgery, delaying the development of scholars.

There are few instances in which a properly conceived teaching assistantship is not fundamental training even for those who think they certainly will not teach. No less valuable in most fields is the research assistantship, which gives the apprentice a stake in productivity under control of experience. In general, experience indicates that a kind of progress from teaching assistantship to research assistantship to fellowship is most satisfactory. To produce scholars on all campuses, properly trained and in numbers sufficient to meet the demands of the coming years, the number of assistantships must be rapidly expanded on new campuses, and the number of fellowships throughout the University. Lack of adequate support is cutting short the productive life of scholars by years, and the total loss to society cannot be estimated.

VIII

The Master's Degree

Training is a logistical problem everywhere. The world can seldom afford the time and expense for ideal training, and no one worth his salt ever thinks he has had even adequate training. The present twofold pressure of "defense" and population increase forces us to scrupulous examination of our training program to be sure we are releasing fighters from training camps as fast as possible. This Committee believes that the slack period of the thirties helped to develop a tradition, not of inefficiency in training, but of demanding more nearly the ideal than the present and prospective economy can stand. The University, in full cooperation with all professions, must discover where time may be saved in training practitioners without losing an iota of the sense of professional responsibility. The Committee emphasizes that this problem faces all fields ("defense," for example, is a total front), but it here specifically treats of *teaching*. The University is properly pressed to train a far larger number of scholars for teaching than ever before.

This Committee believes the master's degree from the University should indicate that the master has the scholarly qualifications for teaching in any academic secondary or undergraduate program in the field stipulated. The University should take all necessary steps to see that its graduate training program achieves this objective. It believes that any student with proper qualifications for admission to graduate work—that is, including an undergraduate major in the field, discipline in the tools of scholarship, appropriate prerequisites, e.g., in language and mathematics, and scholarly promise—should in one year of full-time study become eligible to receive the master's degree. It believes that this aim can be accomplished with no slackening (indeed, with intensification) of research in the program of study—that if a thesis is not submitted and accepted, at

least every master will have completed a seminar centering on a problem of research culminating in a scholarly conclusion. The Committee favors the principle of Plan I, but under any circumstances it rejects the notion that fulfillment of requirements in courses justifies the degree. It further rejects and asks the faculty to eliminate the award of the master's degree as a "consolation prize."

To solve the logistical problem, we must be prepared to train less extensively. Ignorance is not a sin, and intellectual humility is becoming to a scholar. But what we should not sacrifice in awarding the master's degree is the sense of responsibility for advancement of learning, especially in the profession of teaching. An ignorant scholar may be only a step in advance of his students, but it will be a step in the right direction.

IX

Recommendations

1. To implement, promote, and aid in the establishment and expansion of graduate programs of quality on smaller campuses, teaching and research assistantships should be provided in all areas basic to full graduate instruction.

2. Reiterating the actions of previous Faculty Conferences, this Conference should emphasize the need for increased state and private support of graduate fellowships on all campuses of the University. The increase should not only take care of the growth in size of the graduate student body, but should make fellowships available for a higher proportion of graduate students, with a view to meeting the demands for a larger proportion of productive scholars.

3. With a view to spreading both experience and vigor throughout the University, departments instituting doctoral programs should be encouraged to initiate discussions with departments on other campuses experienced in such programs, for the purpost of arranging temporary exchange of faculty members; and the Administration should be asked to cooperate in financing such exchanges.

4. The University should expend full effort toward maintaining a balance between support for research and graduate training in fields like engineering and the physical, medical, and biological sciences and in fields like the arts, humanities, and social sciences, and should use whatever means are available to awaken the public to dangers inherent in a marked imbalance in scholarship.

5. A definite policy and procedure should be established and published that permits graduate students registered on any campus of the University to obtain full library privileges and to enroll in graduate courses and seminars on other campuses.

6. The University should award the master's degree in academic fields as its indication that, granted the candidate has conformed with state laws governing credentials, he is qualified by ability and training to advance learning by teaching a stipulated subject in secondary schools and undergraduate colleges.

7. All departments recommending candidates for master's degrees in academic fields should be advised to scrutinize their requirements for the degree with a view to eliminating any requirement not fully pertinent to the award as defined above; but particular attention should be called to the need for such participation in research as will demonstrate ability to advance learning.

8. All extradepartmental research units, such as institutes and centers, should be asked to include in their periodic reports a statement of their part in the program of graduate training, and to send a copy of that statement to the chairman of the Graduate Council.

Summary of Discussion

Recording Secretaries: James B. Kendrick, Jr., Nicholas V. Riasanovsky

A lively discussion developed on the philosophy of the master's degree program.

It appears that the master's program serves several functions in the University. It is an integral part of the educational program in the teaching, engineering, and other professions; it is a testing ground for prospective Ph.D.'s as well as an intermediate degree towards that goal; and in some quarters it is a consolation prize for those who are not properly qualified for more advanced graduate degrees. There was a strong feeling that the master's degree was of considerable value for many departments. The degree could be greatly strenghtened (*1*) by increased financial support, geared specifically to the prospective student who only intended to obtain the master's degree; (*2*) by a program which recognized that many institutions will draw heavily upon people with master's degrees to teach during the period of a rapidly expanding student enrollment; and (*3*) by encouraging people who intend to be the practitioners of science to seek the master's degree. It was strongly felt there should be no lowering of standards in the master's degree program, that quality rather than quantity should remain the primary goal.

Section VII on "Human Resources" was examined with some vigor. The balance between teaching and research is a subtle integration of the two approaches of learning, swinging in one or the other direction, depending on the interests of the individual. It was suggested that to make a better use of the available human resources, the University should operate on an eleven-month basis with the summer session an integral part of the school year and carried on the regular budget. In this manner, (*1*) young academic men could seek additional experience and employment in staffing these sessions; (*2*) distinguished scholars from other universities would be attracted to those campuses with favorable climates; and (*3*) students could accelerate the fullfillment of their requirements by utilizing the summer course offerings.

The role of the institutes was discussed. A need was expressed for an integrative philosophy of institutes on all the campuses. Institutes play an important role in bringing distinguished personnel and new funds to a campus as well as in centralizing a research area. The future development of institutes as units of graduate studies needs further clarification. A plea was made for the faculty to be aware of possible abuses of institutes, such as a too-rapid proliferation of institutes with the ensuing problems of large space requirements, and the need for large technical staffs. A potential undesirable result might be the dilution of the University's teaching function.

Problems of financial support of graduate students were considered. The physical and life sciences presumably have ample funds to support their graduate students, whereas there are grave weaknesses in the financial support of graduate students in the social sciences and humanities. Adequate preassigned support is desperately needed for the first-year graduate student who might otherwise go where such support is available; for the fourth-year student who is gathering material for his thesis (including travel and subsistence funds to make use of the Eastern library centers); and for the student who intended to work only for the master's degree. Apparently there is considerable reluctance on the part of Universtiy committees to provide fellowships for students who are primarily candidates for the master's degree.

Funds to support graduate fellowship programs may be derived in the future from the Patent fund. It was suggested that patentable projects be brought to the attention of the Patent Board at the earliest opportunity prior to any publication in order that the Board may advise the scientist on legal protection of his discovery.

As an additional technique for the dissemination of knowledge, the usefulness of the University of California Press was emphasized. Distinguished monograph series in a limited area are readily handled by this facility.

Professor Howel Williams summarized the feelings of the Conference when he stated with vigor that the most important function of the University is to cultivate the life of the mind. The Conference applauded his remarks.